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AUTHOR Cwikla, Julie

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ABSTRACT

This report examines teachers' educational background and students' overall performance on the Third International Mathematics and Science Study-Repeat (TIMSS-R). Data analyses show that there are 17 Delaware classrooms performing above the average U.S. student score of 502. The majority of teachers in the top 10 higher performing classrooms had undergraduate degrees in mathematics. The overall trend indicates that the higher performing classrooms have teachers with a graduate degree. Teachers' years of experience are not correlated with higher or lower student performance. (KHR)

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ED 468 820

TEACHER PREPRATION: HOW IS IT LINKED TO STUDENT ACHIEVEMENT?

Julie Cwikla, Ph.D.
Mathematics Education
University of Southern Mississippi

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INTRODUCTION

The first set of research studies (www.rdc.udel.edu) focused on the Delaware Science Coalition's performance on the Third International Mathematics & Science Study - Repeat (TIMSS-R) indicated there are performance differences across students with various ethnic backgrounds on both the TIMSS-R and the Delaware Student Testing Program (Cwikla, 2001). The recently released TIMSS-R data allow students to be linked to their teacher. This report will examine teachers' educational background and their students' overall classroom performance.

TIMSS-R PERFORMANCE SCORES

The TIMSS-R performance scores were computed using "plausible values" or multiple imputation methods. Each student was administered only a fraction of the mathematics items. Time would not allow each student to complete every item. A plausible value is an estimate of how each student might have performed if they had been administered the entire test. Five plausible values were computed for each student, based on responses to the item set administered and responses by students' with similar characteristics and other items. Therefore reporting an individual student's plausible score(s) is not statistically reliable. However, examining classroom performance and groups of students provide performance trends.

A separate study examined the highest and lowest TIMSS-R performers in Delaware and their teachers' characteristics (Cwikla, 2002). This study grouped students by their mathematics classroom and teacher to investigate overall classroom performance and teacher preparation. Mathematics classroom average performance scores were used to separate classrooms into high and low performers. As with previous TIMSS-R studies I have conducted there is no one golden key and in this case, no "perfect" teacher. However, there are trends and similar characteristics across teachers of the higher performing classrooms. And likewise, there are similarities across teachers of the lowest performing classrooms. Keep in mind these scores are based on plausible values and this report links average classroom scores and does not address individual students who might be outliers within their classroom.

OVERALL DELAWARE CLASSROOM PERFORMANCE

When average classroom performance is examined there are 17 Delaware mathematics classrooms performing above the U.S. national average mathematics score of 502 and 30 classrooms performing below the national average. The figure below shows the distribution of all participating Delaware classrooms and the U.S. national average (See Figure 1).

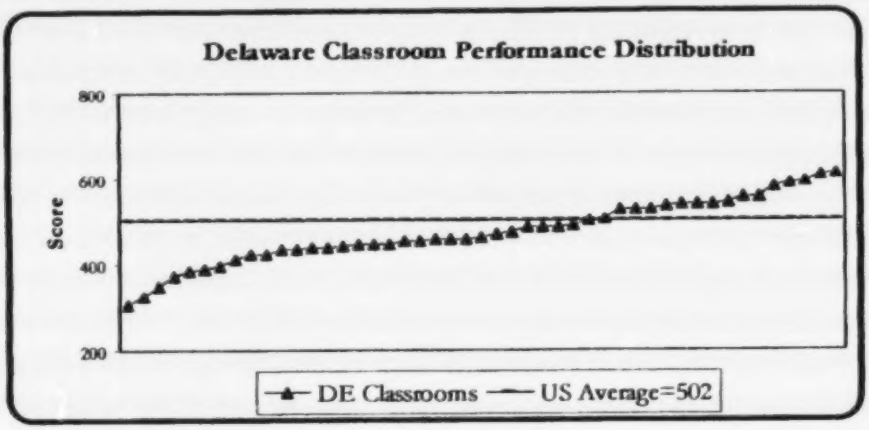

Figure 1: Mathematics performance by classroom.

HIGHEST PERFORMING CLASSROOMS & THEIR TEACHERS

Forty-seven Delaware mathematics classrooms were selected to provide a stratified sample of students in the coalition to participate in the TIMSS-R study. In a separate study (Cwikla, 2002) the top 40 individual student performers were linked to 13 teachers, 12 of whom provided educational background information. In this study, the top 10 performing mathematics classrooms were linked to their teachers' characteristics and educational background (See Table 1).

Table 1: Top Performing Delaware Classrooms' Teachers' Background

Teacher	Average Classroom Performance	Bachelors	Masters	Years Experience
1	613	Mathematics	Mathematics	1
2	607	Mathematics	Mathematics Education	30
3	592	Mathematics & Education	Mathematics Education	31
4	588	Mathematics	Mathematics Education	16
5	582	Other	None	1
6	559	Mathematics & Education	None	4

7	557	Mathematics	Mathematics Education	29
8	548	Mathematics	Mathematics Education	12
9	542	Mathematics	None	13
10	541	Mathematics Education	Mathematics	20

The majority of the teachers of the top performing classrooms hold a masters degree in mathematics or mathematics education. In addition all but one teacher holds an undergraduate degree in mathematics or mathematics education.

LOWEST PERFORMING CLASSROOMS & THEIR TEACHERS

The teachers' characteristics of the 10 lowest performing classrooms are displayed in Table 2 below. Four low performing classes were eliminated because they had less than twelve students. It is hypothesized that these classes might have been remedial classes or for students with special needs. The majority of the teachers of the low performing classes do not hold masters degrees.

Table 2: Lowest Performing Delaware Classrooms' Teachers' Background

Teacher	Average Classroom Performance	Bachelors	Masters	Years Experience
1	371	Mathematics	None	6
2	387	Education	Mathematics Education	27
3	396	Mathematics & Education	None	3
4	411	Mathematics	Mathematics	11
5	423	Other	None	5
6	423	Mathematics	Mathematics Education	15

7	434	Mathematics	None	13
8	441	Mathematics Education	Mathematics Education	1
9	447	Other	None	2
10	453	Mathematics	None	1

It should be noted that all of these data are teacher reported and teachers' backgrounds cannot be verified. Moreover the survey was designed so that teachers could check more than one major degree, and it is not clear in the case when mathematics and education were checked, if that indicates a double major, a minor, or teacher certification. This issue was complicated by the order of the choices on the survey: mathematics, education, and mathematics education. Teachers might have checked choices without first reading the whole list and then not changed their response. These data should be interpreted with these issues in mind.

CONCLUSIONS

A summary of these data analyses follow.

- There are 17 Delaware classrooms performing above the average U.S. student score of 502.
- The majority of teachers of the top 10 higher performing classrooms have undergraduate degrees in mathematics.
- The overall trend indicates that the higher performing classrooms have teachers with a graduate degree.
- Teachers' years of experience are not correlated with higher or lower student performance.

REFERENCES

Cwikla, J. (2002). *Differential mathematics performance on the TIMSS-R across Delaware student of color.* Technical Report: University of Southern Mississippi.

Contact the author with comments/questions: Julie_Cwikla@yahoo.com

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Printed Name/Position/Title: JULIE CWIKLA / ASST. PROF.

Organization/Address: UNIV. SOUTHERN MISSISSIPPI
244 LOVERS LN. OCEAN SPRINGS, MS 39564-2833

Telephone: 228-547-6547

FAX:

E-Mail Address: julie.cwikla@usm.edu

Date: 8/25/02

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